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A proposed comprehensive framework for formulating strategy: a Hybrid of balanced scorecard, SWOT analysis, porter`s generic strategies and Fuzzy quality function deployment

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Abstract

This paper is proposing a comprehensive framework in order to formulate strategy in organizations. This approach is based on generic strategies as criteria for selecting competitive strategies. In this method, firstly, we have studied Porter`s five competitive forces to determine the nature of competition in the industry. Then by using SWOT matrix, we have formulated initial strategies of the organization. After that, we have allocated these strategies to four BSC perspectives. Then making use of these strategies in the HOQ as "Hows/ alternatives", we subsequently considered generic strategies with the role of "Whats/ criteria" in the HOQ as a criteria for selection of strategies. Finally we performed screening and selection of initial strategies by using fuzzy screening technique. A case study is utilized to show the efficiency of the proposed model.
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Keywords: SWOT analysis, balanced scorecard, generic strategies, fuzzy quality function deployment

1. Introduction

Many researches were done for formulating strategy whereby the model offered by Lee and KO (2000) is one of the most famous one. They proposed the combination of balanced scoredcard (BSC), SWOT analysis and quality function deployment (QFD) as comprehensive strategic formulation framework. But they also applied the same concept of Sun Tzu`s art of war (STAW). Sun Tzu described the philosophical concept of strategy. STAW is rooted in ancient China, as applied in battlefield. When preparing a SFF the necessity of using this concept is in doubt (Ip & Koo, 2004). However in this paper, we have proposed a similar framework, by using Porter`s generic strategies instead of ancient strategies. Generic strategies are very famous as a prominent model in strategic management in modern management and most managerial texts. The other dominant characteristic of generic strategies is the case where it empowers the company to challenge with the Porter's five competitive Forces and prepares the situation to surpass other competitors. These characteristics create the motivation of choosing generic strategy as criteria for choosing and screening competitive strategies which was formulated by SWOT matrix. Although the model proposed by Lee and Ko (2000) applied the traditional QFD method , the proposed model in this paper apply fuzzy

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QFD for decreasing the lack of certainty in data that increases the ability and efficiency of this model in comparison with Lee and Ko`s model. Moreover, as another prominence, in order to increase the ability in strategy formulation, we propose to study competitive situation for the organizations according to Porter's Five Competitive forces. This paper also illustrates how the proposed model can be used to formulate the strategy into function for an educatonal organization.

2. Literature review

2.1. Porter`s Five Competitive Forces

Porter (1998) states that the nature of competition in one industry depends on the basic competitive factors which consist of the following competitive factors such as new sellers threat, the threat of substitute products, the supplier`s bargaining force, the power exerted by the customers in the market and intensity competition among competitors, whereby they reflect the fact that competition in one industry is so much higher than the existence of current players. All of the above five factors, determine the intensity of competition in industry and profitability with each other, basically identifying the industrial structure is considered as the beginning point for strategic analysis.

2.2. SWOT Analysis

SWOT analysis is a useful tool for strategic planning in environmental management, and supplies the basic foundation for identifying the situation and designing future procedures which is necessary in strategic attitude. (Nikolaou & Evangelinos, 2010). SWOT matrix analyzes the internal strengths and weaknesses as well as external opportunities and threats to derive promising future strategies. (Rauch, 2007). It should be noted also that SWOT is a strategic tool accommodating internal strengths and weaknesses with external opportunities and threats. SWOT analysis is a systematic analysis for identifying these factors that formulates strategies by creating the best accommodation between internal and external factors. So through analogy of these factors, it can present four types of strategies such as SO, ST, WO and WT. Therefore, SWOT matrix is a tool which is used in this research in order to formulate initial strategy of instructional organization.

2.3. Balanced Scorecard

Balanced scorecard is a strategic method and functional management system. The BSC includes a set of measures to monitor organizational performance across four linked perspectives - financial, learning and growth, customer and internal process- associated with value creation. BSC advantage is the point that provides the leading and lagging indicators at the disposal of managers. The term balance is used in BSC because balanced scorecard creates the balance between financial and non-financial indicators, measurable and immeasurable scales, internal and external aspects and similarly the functional stimulus and results. The relationship between strategic planning and balanced scorecard is very important; hence we can consider them as complementary tools. Actually BSC translates strategic guidelines described in strategic planning in such a way that everyone in the organization can perceive them. (Kaplan & Norton, 2004)

2.4. Quality Function Deployment (QFD)

The Quality Function Deployment was originated in the late 1960s to early 1970s, in Japan, by Professor Yoji Akao. QFD is a systematic method and analysis for acquiring the demands of customers. By using QFD, organizations can turn the customer`s voice to rules and instructions for production planning. Also it can change the future products and designs (Liang, 2010). A central element in QFD is the so-called ‘‘House of Quality’’ (Poel, 2007). HOQ made up of two main parts, the "What’s" and the "How’s" .While using QFD the most important task is to define and understand the "whats" of the needs of the customers and to define the "Hows" to meet the customer`s

need (Tan et al, 1998). Quality function deployment aids effective strategic decision making (Maritan & Panizzolo, 2009). Strategic QFD with definite method translates the vision into action in a series of logical steps. Therefore it creates innovative strategies for acquiring organisation's vision (Killen et al, 2005).

2.5. Generic Strategies

Generic Strategies which was proposed by Porter (1980) was known as a dominant paradigm in strategic management and marketing literatures (Salavou, 2010). Porter proposed three fundamental strategies - differentiation, cost leadership, and focus - in confronting Porter`s five Competitive Force for overcoming other competitors of a company in industry. Porter stated that a company performs best by choosing one strategy to concentrate on. But most researchers such as (Hlavacka et al , 2001; Kim et al, 2004; Allen & Helms , 2006) state that combination of these can create more chance for acquiring the competitive advantages. In this paper we have used generic strategies as criteria for screening the initial strategy of educational organization.

2.5. Fuzzy Screening

Fuzzy Screening involves the participation of several experts in decision-making process. Furthermore, each offered decision by experts is based on several criteria. (Fuller, 2000). Fuzzy screening includes three parts: First part is a collection of decision-making alternatives which we will choose among them a small subset for more investigation: A= {A_1, A_2,…, Am}. Second part consists of criteria collection for evaluating alternatives based on them: C= {C_1, C_2… C_m}. Third part as forming a group of experts which their options is solicited in screening the alternatives: E= {E_1, E_2, E_3,…, Er}. Regarding the above opinions, the fuzzy screening system is a two stage process; in the first stage we want every individual to present its evaluation about each alternative and also weighting different criteria based on linguistic scales. On the other hand, each expert should state how much each alternative can satisfy criteria. In the second stage, introduced methodology is applied to aggregate the individual experts' evaluations to obtain an overall linguistic value for each object. This overall evaluation can then be used by the decision makers as an aid in the selection process (Yager, 1993).

3. Proposed methodology

Step1. Studying the nature of competition in the industry based on Porter's five competitive factors : when competitive factors in an industry and its main cause is known, the company is placed in a position that can identify the main source of competitive factors with regard to its abilities and capabilities, the areas in which they should enter the competition, and determine the areas that they should avoid competing in.
Step2**.** Formulating initial strategy by SWOT matrix: by using SWOT matrix, the main internal and external key factors are compared and Initial strategy is formulated for the organization.
Step3. Linking the SWOT analysis with the balanced scorecard: By linking the SWOT analysis with the balanced scorecard, an organization can balance its strengths against its competition's weaknesses, and optimize its Opportunities within the market (Lee & Ko, 2000)
Step4**.** Applying strategies derived from previous steps in HOQ as (Hows). In fact, HOQ in a simple and concrete form with relating Hows and whats to each other can help to translate the different elements of strategic planning.
Step 5.Applying generic strategies in HOQ as Whats: as stated before, in the face of competitive forces, Porter's generic strategies are proposed. Hence, to deal with the five competitive forces we should select the strategies that satisfy the three generic strategies. Therefore, the role of generic strategies as "Hows" are responsible for house of quality and used as criteria to choose and screen SWOT matrix strategies.
Step 6. Screening Strategies Using Fuzzy Screening Technique : various inputs, in the form of judgments and evaluations are needed in the QFD charts; this gives rise to uncertainties when trying to quantify the information. In order to reduce the uncertainty in the collected data, fuzzy logic can be used (Bouchereau & Rowlands, 2000). After completing HOQ, the fuzzy screening technique is used to screen and classify prior strategies. Each strategy of SWOT analysis is segregated in four BSC perspectives, considered as (alternatives / Hows) and generic strategies as (criteria / Whats).

4. Application of methodology to screen Strategies of a university

To implement the above six steps we selected one Iranian university as the case study. In step 1 with the assistance of expert team the result was that Entrance barriers is low, Replacing service is high, the power exerted by the customers (students) is medium, supplier`s bargaining force is low and intensity competition among competitors is high. Results of steps 2, 3, 4, and 5 have been shown in figure (1). In step 6, the first expert`s team was asked to state a grade of importance of criteria in the scale S. the result of shown in Table (1). The criteria for screening strategies in this research include C_1: cost leadership, C_2: differentiation strategy, C_3 : focus on the development of MA and Ph.d, C_4 :Focus to attract local volunteers to go to university

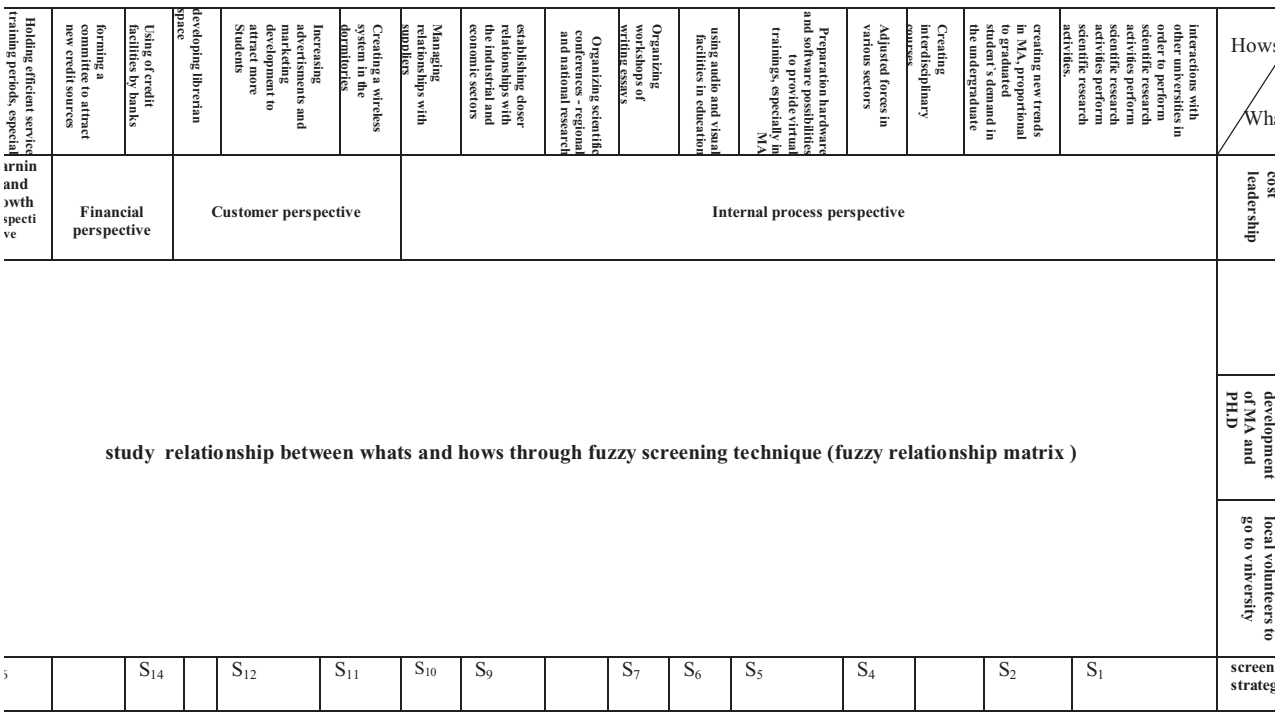

Figure 1. Linking SWOT, BSC, QFD and fuzzy screening

Table 1. grade of importance of criteria

E	C_1	C_2	C_3	C_4	E	C_1	C_2	C_3	C_4	E	C_1	C_2	C_3	C_4
1	H	VH	H	L	9	H	H	M	L	17	H	OU	M	L
2	VH	VH	M	M	10	VH	OU	H	L	18	VH	VH	H	L
3	H	OU	H	L	11	H	H	H	L	19	M	VH	M	L
4	M	VH	H	M	12	H	VH	H	L	20	H	VH	H	L
5	M	H	H	L	13	VH	VH	VH	L	21	M	VH	H	L
6	VH	OU	M	L	14	M	OU	H	L	22	H	OU	M	M
7	H	OU	M	L	15	M	VH	H	L	23	VH	VH	H	L
8	M	VH	H	M	16	H	OU	M	L	24	H	OU	H	L

Then each of experts was asked to specify the level of possibility of satisfaction of desired criteria in connection with each alternative (initial strategy). The results have been shown in Table (2). Next stage is identifying unit evaluation by each expert of any alternatives (initial strategy). For this ,we initially calculate negative of importance

for each of scale S elements by using the formula(1) $Neg(S_i)=S_{7-i+1}$ (1) Neg (VH)= VL , Neg(H)= L , Neg(M)=M Neg(L)=H , Neg(VL)= VH , Neg(N)= OU

Then unit score for alternatives by each expert is calculated using the formula(2) . That it has been done for the strategy of "Preparation hardware and software possibilities to provide virtual trainings, especially in MA" .the result have been shown in table (3) $U_{ik}=\min\{Neg(I_{kj})v\pi_{ikj}\}$ i=1,2,3…m k=1,...,r (2)

Table 2. level of possibility of satisfaction of desired criteria

S	E	C_1	C_2	C_3	C_4	E	C_1	C_2	C_3	C_4	E	C_1	C_2	C_3	C_4
S_5	1	H	OU	OU	L	9	H	VH	VH	L	17	M	VH	H	L
	2	H	VH	VH	L	10	H	OU	H	L	18	H	VH	H	L
	3	H	OU	VH	L	11	H	VH	H	M	19	H	OU	H	L
	4	M	OU	OU	M	12	M	OU	H	M	20	M	H	H	L
	5	H	VH	VH	L	13	H	VH	H	L	21	H	VH	OU	L
	6	H	OU	VH	L	14	H	H	H	L	22	H	OU	M	M
	7	H	VH	VH	L	15	M	VH	H	L	23	VH	VH	H	L
	8	H	OU	VH	L	16	H	H	H	L	24	H	OU	H	L

Table3. Unit score for strategy, min $\{Neg(I_{kj})v\pi_{ikj}\}$

S	E	C_1	C_2	C_3	C_4	min	E	C_1	C_2	C_3	C_4	min	E	C_1	C_2	C_3	C_4	min
S_5	1	H	OU	OU	H	H	9	H	VH	VH	H	H	17	M	VH	H	H	M
	2	H	VH	VH	M	M	10	H	OU	H	H	H	18	H	VH	H	H	H
	3	H	OU	VH	H	H	11	H	VH	H	H	H	19	H	OU	H	H	H
	4	M	OU	OU	M	M	12	M	OU	H	H	M	20	M	H	H	H	M
	5	H	VH	VH	H	H	13	H	VH	H	H	H	21	H	VH	OU	H	H
	6	H	OU	VH	H	H	14	H	H	H	H	H	22	H	OU	OU	M	M
	7	H	OU	VH	VH	H	15	M	VH	H	H	M	23	H	H	VH	H	H
	8	H	OU	VH	VH	H	16	H	H	H	H	H	24	H	H	H	H	H

Now, it is turn to combine conducted evaluation by experts to reach a general evaluation of any alternative .To do this, first we sorted unit scal of experts as descending. The result have been shown in Table (4)

Table 4. Sorted unit scal of experts as descending

$B_{11}=H$	$B_{12}=H$	$B_{13}=H$	$B_{14}=H$	$B_{15}=H$	$B_{16}=H$	$B_{17}=H$	$B_{18}=H$	$B_{19}=H$	$B_{110}=H$	$B_{111}=H$	$B_{112}=H$
$B_{113}=H$	$B_{114}=H$	$B_{115}=H$	$B_{116}=H$	$B_{117}=H$	$B_{118}=M$	$B_{119}=M$	$B_{120}=M$	$B_{121}=M$	$B_{122}=M$	$B_{123}=M$	$B_{124}=M$

Now we consider aggregation function of making decision body as an average function Q(K), then with r =24 , q=7 and by using the formula(3). We provide Table (5) $(Q_A)k=S_{b(k)}$ $b_k=int[1+k\frac{q-1}{r}]=int[1+\frac{k}{4}]$ (3)

Finally, the overall evaluation of the desired alternative 'joint investment with domestic and foreign competitors 'will be by using the formula 4: $U_i=\max\{Q(j)\ \Lambda B_{ij}\}$ (4)

Table 5. Aggregation function results

k=1	$Q_A(1)=N$	S_1	k= 7	$Q_A(7)=VL$	S_2	k= 13	$Q_A(13)=M$	S_4	k= 19	$Q_A(19)=H$	S_5
k=2	$Q_A(2)=N$	S_1	k= 8	$Q_A(8)=L$	S_3	k= 14	$Q_A(14)=M$	S_4	k= 20	$Q_A(20)=VH$	S_6
k=3	$Q_A(3)=N$	S_1	k= 9	$Q_A(9)=L$	S_3	k= 15	$Q_A(15)=M$	S_4	k= 21	$Q_A(21)=VH$	S_6
k=4	$Q_A(4)=VL$	S_2	k= 10	$Q_A(10)=L$	S_3	k= 16	$Q_A(16)=H$	S_5	k= 22	$Q_A(22)=VH$	S_6
k=5	$Q_A(5)=VL$	S_2	k= 11	$Q_A(11)=L$	S_3	k= 17	$Q_A(17)=H$	S_5	k= 23	$Q_A(23)=VH$	S_6
k=6	$Q_A(6)=VL$	S_2	k= 12	$Q_A(12)=M$	S_4	k= 18	$Q_A(18)=H$	S_5	k= 24	$Q_A(24)=OU$	S_7

U_i=max {N Λ H, N Λ H, N Λ H,VL Λ H, VL Λ H, VL Λ H, VL ΛH, L ΛH, , L ΛH, L Λ H, L Λ H , M Λ H, M Λ H, MΛH ,MΛH, HΛH, HΛH, HΛM ,HΛM, VHΛM ,VHΛM , VHΛM, VHΛM, OU Λ M} =Max{N,N,N,VL,VL,VL,VL,L,L,L L,M,M,M,M, H ,H ,M,M,M,M,M,M,M}=H

Therefore evaluation of "Preparation hardware and software possibilities to provide virtual trainings, especially in MA" with average aggregation function is high and because the standard in selecting strategy in this university are those strategies which their importance is equal or greater than Medium, hence this strategy is selected .According to this method, the results of screening other strategies have been shown in Figure 1.

Conclusion

This paper offered a framework in order to formulate strategy in organizations. Initially we studied the competitive forces in order to identify the main competitive factors. Then when we looked at the abilities and capacities of the company, we looked for areas in the organizations which should avoid competition, and also the areas the company should enter the competition. Applying SWOT analysis, we formulated initial strategies, and then allocated these strategies in four perspectives of BSC; this is a step toward the implementation of these strategies. In this paper regarding the role of QFD as a suitable tool for linking between different elements of strategic planning, the house of quality was used to study relationships between Whats and Hows. Eventually the Fuzzy Screening techniques were used to investigate the relationship between "Whats / Criteria" and "Hows / Alternative". It should be noted the proposed framework can use any other appropriate criteria instead of generic strategies.

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